brought to the hospital wards a rare combination of qualities. He had few equals as a diagnostician and therapeutist. As a teacher, his unswerving scientific attitude to the problems of clinical medicine had on the thousands of students who passed through his hands an influence scarcely to be overestimated. He taught not only accuracy of method, but also precision of language. His gifts as a physician were recognised by his holding, among other distinctions, the offices of physician to the King in Scotland, and of president of the College of Physicians of Edinburgh, of the Association of Physicians of Great Britain and Ireland, and of the Indian Plague Commission. He was knighted in 1902.

As an investigator, Fraser was one of the pioneers of experimental pharmacology. His greatest discoveries from the point of view of their immediate practical application—were those which, in strophanthus and physostigmine, added to our Pharmacopœia remedies still in everyday use for the purposes for which he recommended them. For far-reaching scientific value they were even exceeded by the monograph which he wrote in collaboration with Prof. Crum Brown on the relation between chemical constitution and physiological action, embodying one of the most suggestive and fruitful researches in the history of pharmacology. For his researches he was made a laureate and Barbier prizeman of the French Academy of Sciences, and was awarded the Macdougall Brisbane and Keith prizes of the Royal Society of Edinburgh.

Fraser combined an aptitude for both science and business. He took a keen interest in educational problems and an active part in introducing many university reforms. For twenty years he acted as dean of the faculty of medicine, and for ten years represented that faculty on the University court, and his University on the General Medical Council.

Endowed with a remarkably lucid and quick mind himself, Fraser was intolerant of mental slowness in others, sparing of praise, and at times not slow to censure. But he expected a man's best, and his standard was high. He carried himself—a keen, spare, scholarly figure—with a faint, indefinable hauteur, which may have been to many a barrier to close intimacy. But when this barrier was surmounted, and when he could lay aside the cares of too unremitting labour and of indifferent health, he would weave a grace and charm which few could resist or forget. Especially in later years he fought a continual battle with bronchitis and emphysema with a fortitude which is surely characteristic of sufferers from this condition. That he was so long permitted to lead an active life—for he retired only two years ago—was due in no small measure to the loving care and encouragement of Lady Fraser and the kindly supervision of his staunch friend and physician, Sir James Affleck.

Plummer, Gregory, Fowler, Withering, Lister, Simpson, Hughes Bennett, Christison, Brunton, Fraser—alumni or professors of the University of Edinburgh, a roll enviable and for one medical school possibly unequalled—file before us in retrospect. Their achievements in adding to our knowledge of remedies for disease and for pain stretch from the picturesque twilight of empiricism to the clear light of scientific method. With the passage of the last to that unknown bourn, we salute their memory.

J. A. G.

NOTES.

A SPECIAL general meeting of the Royal Society will be held on January 22, at 3.30, to admit H.R.H. the Prince of Wales as a fellow of the society.

THE meeting of February 5 has been set apart by the council of the Royal Society as a meeting for a discussion on "The Theory of Relativity," to be opened by Mr. Jeans and continued by Prof. Eddington, the Astronomer Royal, and others.

THE International Research Council has been constituted, by successive meetings in London, Paris, and Brussels, as a Federation of National Research Unions. Under its auspices unions are being formed for the organisation of international work and co-operation in different departments of science, the unions already instituted being for astronomy, geodesy and geophysics, mathematics, and (provisionally) chemistry and biology. The question of international organisation in science is raised, to a great extent, by Article 282 of the Peace Treaty, which states that "treaties, conventions, and agreements of an economic and technical character not included in a specified list cease to be operative." That this article was intended to cover conventions on scientific matters appears from the list of exceptions, in which the Metric Convention and the International Agricultural Institute at Rome are included.

WITH the view of obtaining the opinion of representatives of pure and applied science upon the subject of the co-ordination of international effort and action, a special meeting of the Conjoint Board of Scientific Societies was held at the Royal Society on January 8. After much discussion the following resolutions were passed:—"(1) That the executive committee be requested to appoint committees for the purpose of considering the desirability of forming in branches of science, as recommended by the Brussels Conference, international unions connected with the International Research Council, or of joining such Unions if formed independently. (2) That these committees be authorised to make recommendations with regard to the proposed statutes and the constitution of national research councils. (3) That the committees consist of representatives nominated by the principal societies concerned, together with additional members nominated by the executive committee."

WE regret to see the announcement of the death on January 11, at seventy-three years of age, of Father J. N. Strassmaier, the distinguished Assyriologist, whose work with Father Epping on Assyrian astronomy is well known.

THE Scientific Instrument, Glassware, and Potash Production Section of the Board of Trade has been transferred from 7 Seamore Place, W.1, to the main offices at Great George Street, S.W.1.

THE council of the Geological Society of London has this year made the following awards:—Wollaston medal, Prof. Baron Gerard Jakob de Geer (Stockholm); Murchison medal, Mrs. (Dr.) E. M. Shakespear; Lyell medal, Mr. E. Greenly; Wollaston fund, Mr. W. B. R. King; Murchison fund, Dr. D. Woolacott; and Lyell fund, Dr. J. D. Falconer and Mr. E. S. Pinfold.

THE Secretary of the Department of Scientific and Industrial Research announces that the Research Association for the British Launderers' Industry has been approved by the Department as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. As the association is to be registered as a non-profit-sharing company, the promoters have applied to the Board of Trade for the issue of a licence under section 20 of the Companies (Consolidation) Act of 1908. The secretary of the committee engaged in the establishment of this association is Mr. J. J. Stark, 162–165 Bank Chambers, 329 High Holborn, W.C.2.

WITH the approach of a return to normal conditions, the Natural History Museum, we are glad to learn, is developing a policy of adding to the national collections by means of exploration. Thus Mr. Willoughby Lowe, who has already made several expeditions to Africa on behalf of the museum, has recently started on a mission to the West Coast of Africa for the purpose of collecting specimens for South Kensington, and Capt. Hubert Lynes, R.N., has just left England on an expedition to Darfur, where he intends to make a special survey of the avifauna of the Jeb-Maria Mountains, which should yield many forms new to science to the Bird Department. Other similar expeditions are, we believe, contemplated by the museum authorities.

A MEETING of surgeons, representing the surgical staffs of all the great teaching hospitals of Britain, assembled in the theatre of the Royal College of Surgeons of England on January 8, under the chairmanship of Sir Rickman J. Godlee, and resolved to form an "Association of Surgeons of Great Britain and Ireland." British surgeons have thus followed the precedent set by their colleagues the physicians, who formed a similar association a number of years ago. The object of the newly formed association is to permit surgeons on the staffs of the greater hospitals to meet together from time to time at various centres in order to exchange observations and compare results. The association will stand as the representative body for British surgeons, and in that capacity will represent British interests at international surgical congresses. Sir John Bland-Sutton was elected president of the new association.

ACTIVE steps are now being taken in the movement to establish a memorial to Lord Lister in Edinburgh. The movement had already begun to take shape in 1914, but its progress was arrested by the outbreak of war. The war, which has caused delay, has given at the same time an overwhelming demonstration of the value of Lord Lister's work. The University and Royal Colleges of Physicians and Surgeons in Edinburgh, under the control of which the memorial will be established, have determined to provide an institute for research and teaching in medicine. A site has been secured, and a committee is now being formed to make an appeal to the public for a sum of 250,000*l.* Mr. Balfour, Chancellor of the University, has consented to be president of the committee, with the Duke of Atholl, Lord Rosebery, Lord Beatty, Lord Glenconner, Lord Leverhulme, and Sir J. Lorne McLeod as vice-presidents.

THE Journal of the Washington Academy of Sciences for December 19 announces that Mr. E. C. McKelvy, of the Chemical Division of the Bureau of Standards, died on November 29, in his thirty-sixth year, as the result of burns caused by an explosion of ammonia-condensing apparatus containing petroleum-ether cooled by liquid air. Mr. McKelvy was born at Upper Sandusky, Ohio, on May 9, 1884. He joined the staff of the Bureau of Standards in July, 1907, and was chief of the physico-chemical section of the Chemistry Division at the time of his death. His work for several years past had been on the physical constants of ammonia and other substances used in commercial refrigeration. He was a member of the Washington Academy of Sciences and one of the associate editors of its Journal, and had been secretary of the American Chemical Society since 1915.

AN exhibition of radiographic prints has been arranged by the Röntgen Society, and is being shown at the Royal Photographic Society's house at 35 Russell Square, W.C.1. The exhibition is open free to the public until February 7, between 11 a.m. and 5 p.m. daily. The two hundred or so prints which are hung on the walls of the gallery well illustrate present-day practice in both medical and industrial radiology as developed by some of the leading X-ray workers in this country. We hope to make extended reference to the subject in a future issue. Incidentally, the growing custom of holding joint meetings of kindred societies is one much to be commended, and we are glad to note that the Röntgen Society, in addition to its recent joint meeting with the Faraday Society, has similarly co-operated during the present exhibition with the Royal Photographic Society. Furthermore, it has arranged, in the near future, joint meetings with the Institution of Electrical Engineers and the Electro-therapeutic Section of the Royal Society of Medicine. The officers of the Röntgen Society deserve every support for their energy and enterprise.

REFERENCE is made in the *Times* of January 12 to an exceptionally high velocity, at the rate of 180 miles an hour, attained by the north-west wind at 25,000 ft. over southern England on January 9 as a precursor to the recent rough and stormy weather. Deep cyclonic depressions had spread in from the Atlantic, the central area of one passing over the northern parts of Ireland and England on January 10, and a second disturbance skirted our north-western seaboard on January 11, when the barometer in the Hebrides fell to 28·3 in. The intensity of the storm was greatest in the English Channel. In the Scilly Isles the wind attained the velocity of 68 miles an hour in a gust during the evening of January 11. Inland the gusts attained an hourly velocity of 50 to 55 miles. Thunderstorms occurred in many parts of the country, and heavy rain was general, whilst in the Shetlands snow covered the ground to the depth of 6 in. On January 13 the Daily Weather Report of the Meteorological Office showed that the wind in the south of England was blowing at 12 miles an hour, whilst at 4000 ft. it had increased to a rate of 54 miles an hour. During the morning a storm area had its centre over Thorshavn, where the barometer stood at 29·05 in. There were indications of the approach of another disturbance from the Atlantic. The storms have occasioned several wrecks, resulting in serious loss of life.

THE death is announced of the well-known Argentine geographer and naturalist, Dr. Francisco P. Moreno. Dr. Moreno was born in Buenos Aires on May 31, 1852, and doubtless inherited his love of natural science from his mother, who was the daughter of an English botanist. He spent his early years in exploring Patagonia and various parts of the Andes, and devoted himself especially to the making of anthropological and ethnological collections. His first contribution to science, on the prehistoric cemeteries of Patagonia, appeared in the *Revue d'Anthropologie* so long ago as 1874. In 1877 Dr. Moreno gave his collection to the Argentine Government to form the beginning of the Anthropological and Archæological Museum of Buenos Aires. In 1880 Buenos Aires became the federal capital, and two years later the city of La Plata was founded to replace it as the provincial capital. Dr. Moreno then devoted his thoughts and energies to the planning and foundation of a great museum at La Plata which should illustrate the natural history of the Republic. His scheme was realised in 1889, and the well-known publications of the La Plata Museum under his direction began in the following year. In 1898 Dr. Moreno came to London as representative of Argentina in the dispute as to the Argentine-Chilean boundary, which had been referred for settlement to the British Sovereign; and in 1900 he produced his report in four handsome volumes well illustrated with photographs. At the same time he brought and exhibited to the Zoological Society the famous piece of the skin of an extinct ground-sloth which he had discovered in a Patagonian cave. Dr. Moreno was an honorary corresponding member of the Royal Geographical Society, and received the Founder's medal in 1907. He was also a foreign correspondent of the Geological Society and a corresponding member of the Zoological Society of London.

DISPATCHES published in the daily papers last week contain brief accounts of destructive earthquakes that were felt over the greater part of Mexico during the night of January 3–4. The first shock occurred at 9.45 p.m. on January 3; this was followed by a second of great intensity at 10.25, and by a slighter shock at 11 p.m. The epicentral area lies about fifty miles west of the city of Vera Cruz, near the southern end of the Gulf of Mexico, after-shocks being especially frequent to the south of Jalapa. The principal damage, so far as is yet known, is at Cordoba, Jalapa, Coscomatopec, Calcahualco, Teocelo, and Cosautlan. The area within which injury to property occurred is, however, considerable. The city of Vera Cruz is deprived of gas and water, owing to many breaks in the mains, and, even so far west as Mexico City (150 miles from the coast and nearly 200 miles from Vera Cruz), the walls of large buildings were cracked. As in all destructive shocks, the central area was completely isolated, but the unusual violence of the principal shock is also evident from the change in the course of the River San Francisco, the rupture of water-mains at Vera Cruz, and the uprooting of thousands of trees in a forest twenty-five miles from that city. The loss of life is still unknown, but is sure to be considerable. At Coscomatopec it was increased by the rush of people to the church when the first shocks were felt. According to the officials of the Mexican Government Observatory, the centre of disturbance was situated in the volcano of Orizaba, but the earthquake was clearly tectonic, possessing none of the characteristic features of volcanic earthquakes, though the opening of a new crater in the volcano may be connected with the same movement which caused the earthquake. One point of some interest is its occurrence near the north coast of Mexico, the principal seismic regions lying on the south or Pacific side.

IN "Memoirs of the Bernice Pauahi Bishop Museum, Honolulu," vol. v., part iii., for 1919, Mr. T. G. Thrum publishes a long series of native documents from the Fornander collection, giving the Hawaians' account of the formation of their islands, the origin of their race, and their migrations. The records now printed in the original language, with English translations, include fifteen mythical tales, twenty-five traditionary stories, and the legend of Kawelo, which extends to six chapters. The publication is of great importance from the points of view of ethnology, folklore, and linguistics.

IN the Journal of the Royal Anthropological Institute (vol. xlix., January–June, 1919) Mr. J. Reid Moir discusses the occurrence of humanly fashioned flints in the Middle Glacial Gravel at Ipswich. These implements and flakes do not exhibit marked signs of abrasion by water action, and the writer regards it as a possibility that the place where these Middle Glacial specimens are now found cannot be far removed from the deposits in which they rested in an unabraded state, and that the water which laid down the Middle Glacial deposit did not flow at a turbulent rate. The only dateable artefacts so far recovered from this gravel are some small platessiform flint implements, which, though small, otherwise resemble closely the well-known early Chellean implements. "The occurrence of flint implements of early Chellean form in a gravel presumably more ancient than the Glacial Chalky Boulder Clay will no doubt come as a surprise to many archæologists, but there does not seem to be in this case any escape from such a conclusion."

IN the *Public Health Journal* for November (vol. x., No. 11, Toronto) Prof. Fraser Harris discusses the medical and allied professions as a State service.

He considers that the advantages of such a service far outweigh the possible disadvantages. Among the advantages are mentioned the speedy exclusion of quacks and irregular practitioners, and of the struggles for existence and rivalries among the regular practitioners, while the public health would be maintained as never before; treatment would be prompt and of the highest quality; specialists of all sorts easily accessible; and all manner of special treatments readily available for the rich and poor alike.

THE weekly mortality statistics of the influenza epidemic beginning in the autumn of 1918 for thirty-nine large American cities have been subjected to a preliminary analysis by Prof. Raymond Pearl (Reprint No. 548 from the Public Health Reps., Treasury Dept., U.S. Public Health Service). There was considerable variation among the several cities in the relative degree of explosiveness of the outbreak. The analysis appears to demonstrate that an important factor causing this variation was the magnitude of the *normal* death-rates occurring at the same time as the influenza epidemic in respect of pulmonary tuberculosis and diseases of the heart and of the kidneys.

IN *Medical Science: Abstracts and Reviews* for December (vol. i., No. 3) the influenza epidemic of 1918–19 is reviewed in all its aspects. In the civilian population of the United States the total number of deaths attributable to the epidemic was estimated at not fewer than 450,000, a death-rate of more than 4 per thousand. In the County of London some 22,750 deaths were caused by it. The statistics of the Life Insurance Bank of Gotha show that, whereas in 1889–90 epidemic influenza caused no deaths in the age period 15–30, in 1918 the greater number of deaths occurred in this age period—an experience similar to that which obtained in this country.

WE have received a copy of the general report of the Survey of India for 1917–18. Shortage of officers necessitated the curtailment of field work. Several officers and survey parties were supplied for Persia, Mesopotamia, and East Africa. New maps published included 43 one-inch sheets, 65 half-inch sheets, 4 quarter-inch sheets, and 13 sheets of the million map. The report gives useful index maps of all the sheets published up to the present on various scales by the Indian Survey Department.

THE United States Geodetic Survey has published a report on the connection of the arcs of primary triangulation along the ninety-eighth meridian in the United States and in Mexico (Special Publication No. 54). Mr. W. Bowie, the writer of the report, points out that this connection not only makes it possible to compute with greater accuracy than hitherto the dimensions of the earth, but also enables Mexico to extend new areas from the ninety-eighth meridian arc, which can be based on the North American datum, as the United States standard datum is now called. It had been intended to carry out this work in 1913, but the unsettled conditions in Mexico made it necessary to postpone the observations until 1916. The arc of the ninety-eighth meridian was completed to the Canadian frontier in 1907.

THE value of large-scale maps in war is the subject of an unsigned article in *La Géographie* (vol. xxxii., No. 7) on the Service Géographique of the French Army. This Service was practically created by the war, when it was realised that the available maps of France were on too small a scale to be of use. Maps on scales of 1/80,000 and 1/200,000, although valuable for war in the open, were unsatisfactory for trench warfare. Large-scale plans were available only for the neighbourhood of Paris and certain fortified places. It was decided to make maps of the war area on a scale of 1/20,000, 1/10,000, and 1/5000 (*plans directeurs*). Of these the smallest scale was for artillery use, the second for Staff work in general, and the largest scale, confined to front-line areas, for infantry use. Generally speaking, the 1/20,000 proved to be the most useful. It is hoped that this will be extended to the whole of France and be periodically revised. The urgency of the demand in war-time did not allow of detailed resurvey for this work, so recourse was had to existing survey material, land valuation plans, and aerial photography. Specimen sheets of the maps accompany the article.

IN the Bulletin of the Central Meteorological Observatory of Japan (vol. iii., No. 1) Prof. T. Okada attempts to discover a forecasting formula, starting from the undoubted fact that in Japan a hot August means a good crop, and a cold August a bad one, resulting in famine in 1902, 1905, and 1913. Prof. Okada connects the temperature of northern Japan with the sun-spot cycle, but more definitely finds a correlation between the August temperature in that region, the March pressure difference between Zikawei and Miyazaki, and the South American pressure for March to May, using data from Santiago and Buenos Aires. The South American data give larger correlation coefficients (0·5 or 0·6 with $P.E. < 0{\cdot}1$) than the Zikawei-Miyazaki pressure differences (0·3 or 0·4 with $P.E. > 0{\cdot}1$). Treating the districts of Hokkaido and Tôhoku separately, he obtains the yearly variation in the rice crop for the former as $0{\cdot}53x + 0{\cdot}26y$, and for the latter as $0{\cdot}18x + 0{\cdot}10y$, where x is the yearly variation of South American pressure, March to May, and y the yearly variation of pressure gradient, Zikawei-Miyazaki. The table of comparative results shows a fair agreement in sign between calculated and actual yields, especially for Hokkaido, and the conclusion is drawn that, in general, abnormally low pressure in the southern part of South America from March to May and abnormally small pressure gradient in March between Zikawei and Miyazaki are followed by a failure of the rice crop in northern Japan.

DR. G. R. WIELAND, in his "Classification of the Cycadophyta" (*Am. Journ. Sci.*, vol. xlvii., p. 391, 1919), reviews "the gymnosperm phylum," and goes much further than this in providing a table in which the evolution of dominant and specialised land-plants is correlated with the climates of successive geological periods. In this suggestive diagram various types are shown as moving towards "ascendancy and extinction" or "simplification and reduction," sharply or gently from a previous parallel course of evolution.

"Basic or semi-immortal types" of vegetation are represented by a horizontal line running across the bottom of the diagram. Elsewhere Dr. Wieland has lamented the depletion of the already small group of palæobotanists. If he could give us a general treatise on the problems expressed so concisely in his diagram, he might win a keen body of adherents.

MR. GEORGE BARROW, in a paper on "Some Future Work for the Geologists' Association" (Proc. Geol. Assoc., vol. xxx., p. 1, 1919), revives in a remarkable degree the view that some of the features of the chalk surface round London are due to marine erosion, acting probably in Pliocene times. It is urged that the quartz-pebbles of the pre-Glacial high-level gravels were washed into the chalk basin by the waters of a shallow sea, which cut passages in the escarpments and thus originated many of the wind-gaps. The chalk escarpments, together with those of the Lower Greensand, were, in their first form, ridges left by the marine denudation of the softer Gault and Eocene strata. If the "beach deposits" (high-level gravels) are of Pliocene age, no serious post-Pliocene bending of the region can have occurred, since they lie at approximately the same levels. Mr. Barrow suggests that they are little later than the Lenham Beds, and the members of the Geologists' Association are now invited to prove their age by a diligent search for fossils.

DR. R. E. SLADE and Mr. G. I. Higson, of the British Photographic Research Association, communicate to the Journal of the Royal Photographic Society (December, 1919) the results of their investigations, which show that the shape of the characteristic curve of a photographic plate depends not only on the thickness and opacity of the film and the time and method of development, but also on the relation of the different sizes of grains in the film to each other and the quantity of each size present. This new factor they claim to be the most important. If the grains are all of the same size, the curve is the steepest possible. If the grains are of various sizes, the curve is the sum of the curves due to each group of particles of the same size. The larger grains are more sensitive than the smaller grains. Uniformity of grain-size is, therefore, desirable in plates for black-and-white work, and the authors find that the steepness of the curve can be foretold from photomicrographs of the grain. Photomicrographs and curves are given in illustration.

IN May, 1914, we mentioned in these columns two methods which had been devised for reducing the measurement of the horizontal component of the earth's magnetic field to that of an electric current. In the first—due to Prof. Hicks and tested in practice by Mr. W. A. Jenkins (*Phil. Mag.*, October, 1913)—the earth's field was reversed by the current in a coil, and the reversal determined by the time of oscillation of a small magnet. In the second—due to Sir A. Schuster and tested at the National Physical Laboratory by Mr. F. E. Smith (*Terrestrial Magnetism*, March, 1914)—the earth's field was annulled by that of the coil, and a small magnet set itself at right angles to the field. In *Terrestrial Magnetism* for September, 1919, Prof. W. Uljanin, formerly of the Kazan University (from which the staff had to flee on the capture of the town by the Bolsheviks in September, 1918), gives an abstract of a paper he published in Russian in 1915 describing a third method. It retains the sine principle of the Kew magnetometer, but substitutes for the deflecting magnet a pair of coils through which a standard current measured by the potentiometer method is sent. The method gives results at least as accurate as those given by the magnetometer, and takes only a tenth of the time.

Two useful papers on three-electrode thermionic valves have been published recently by the Bureau of Standards, Washington. The first paper, by Mr. J. M. Miller, discusses the connection between the input impedance of the valve and the load in the plate circuit. Theoretical relations are obtained which enable us to calculate the input impedance when the impedance in the plate-circuit is known. It is shown that the results are in excellent accord with experiment. It is interesting to notice that when the load in the plate circuit is inductive, the impedance can be represented as a negative resistance, in which case the valve can act as a generator. The second paper, by Mr. L. M. Hull, gives a partially successful attempt to obtain a method of rating thermionic-valve generators. A clear theoretical statement of the problem is given, and important theoretical conclusions are deduced, but experimental work is still in progress. The problem is one of considerable commercial importance, as thermionic-valve generators are now the standard source of supply for radio-telephone and radio-telegraph systems, except in the few cases when very high power is necessary. The present empirical method used for rating these generators is of little value. All interested in the subjects discussed in these papers, the numbers of which are 351 and 355 respectively, can obtain a copy of them by sending a request to the Bureau.

IN the U.S. Bureau of Standards Scientific Paper No. 350, entitled "Equilibrium Conditions in the System Carbon, Iron Oxide, and Hydrogen in Relation to the Ledebur Method for Oxygen in Steel," it is shown that mixtures of iron oxide and Acheson graphite are not, and mixtures of iron oxide with "cemented" iron or white iron (annealed or unannealed) are, reduced at 900° C. by the carbon in them when hydrogen is passed over them at rates of two litres per hour, or faster. Because of these facts it is probably impossible to determine by the Ledebur method more than 75 per cent. of the oxygen present in steels as ferrous oxide. The effect of rate of passage of hydrogen on the Ledebur oxygen-content of certain steels is shown. The paper can be obtained on application to the Bureau.

SCIENTIFIC Paper No. 347 of the U.S. Bureau of Standards describes an investigation carried out at the Bureau on the heat-treatment of alloys of the duralumin type, and the effect on the mechanical properties observed of variations in the various heat-treatment conditions. Conclusions are also drawn as to the best conditions for the commercial heat-treatment of this alloy. A theory of the mechanism of hardening during the ageing of duralumin is proposed, based on the decreasing solubility with decrease of temperature of $CuAl_2$ in aluminium. The precipitation of this compound, suppressed during quenching, proceeds during ageing, and takes place in a highly dispersed form. To the presence of this highly dispersed constituent is due the hardness of the aged alloy. Those interested may obtain a copy of the paper on application to the Bureau.

A SHORT list of books dealing with entomology, containing 165 titles, has just been issued by *Mr. F. Edwards*, 83 High Street, Marylebone, W.1. Many of the books listed are much reduced in price.

THE latest scientific catalogue (New Series, No. 89) of *Messrs. J. Wheldon and Co.*, 38 Great Queen Street, W.C.2, contains upwards of 1500 items relating to pure and applied chemistry, astronomy, electricity, mathematics, meteorology, physics, etc. In addition, particulars are given of many sets and long runs of scientific serials and transactions of scientific societies which Messrs. Wheldon have for disposal. The price of the catalogue is *2d.*

THE following are among the announcements of books to be published by *Messrs. Macmillan and Co., Ltd.*, between now and Easter:—"Cytology: With Special Reference to the Metazoan Nucleus," Prof. W. E. Agar, illustrated; "The Principles of the Phase Theory: Heterogeneous Equilibria between Salts and their Aqueous Solutions," D. Clibbens, illustrated; "The Theory of Determinants in the Historical Order of Development," Sir Thomas Muir (vol. iii.: The Period 1861 to 1880); "A Manual of the Timbers of the World: Their Characteristics and Uses," A. L. Howard, to which is appended an account of the Artificial Seasoning of Timber by S. Fitzgerald, illustrated; "Essays on the Surgery of the Temporal Bone," Sir Charles A. Ballance, with the assistance of Dr. C. D. Green, 2 vols., illustrated; "Space, Time, and Deity" (Gifford Lectures at Glasgow, 1916–18), Prof. S. Alexander, 2 vols.; "Implication and Linear Inference," Dr. B. Bosanquet; "Mind-Energy," Prof. H. Bergson, translated by Prof. H. Wildon Carr, in collaboration with the author; "The Idea of Progress: An Inquiry into its Origin and Growth," Prof. J. B. Bury; "Essays in Critical Realism: A Co-operative Study of the Problem of Knowledge," Profs. D. Drake, A. O. Lovejoy, J. B. Pratt, A. K. Rogers, G. Santayana, R. W. Sellars, and C. A. Strong; "A Critical History of Greek Philosophy," W. T. Stace; "Through Deserts and Oases of Central Asia," Miss Ella Sykes and Brig.-Gen. Sir Percy Sykes, illustrated; "The Handbook to Cyprus," H. C. Luke and D. J. Jardine, new edition; "The Ila-speaking Peoples of Northern Rhodesia," Rev. E. W. Smith and the late Capt. A. M. Dale, 2 vols., illustrated; "Among the Natives of the Loyalty Group," Mrs. E. Hadfield, illustrated; "England," edited by F. Muirhead (The Blue Guides); and "Highways and Byways in Northumbria," P. A. Graham, illustrated by Hugh Thomson. *The Open Court Co.* (Chicago and London) will publish shortly "A History of the Conceptions of Limits and Fluxions in Great Britain from Newton to Woodhouse," Prof. F. Cajori. It will form No. 5 of the Open Court Classics.

OUR ASTRONOMICAL COLUMN.

SPECTROSCOPIC DETERMINATION OF STELLAR PARALLAX.—Since this method of parallax determination was devised the number of stars of which the parallax has been measured trigonometrically has increased considerably. With the view of testing the accuracy of the curves used for deducing absolute magnitude from the relative strength of certain spectral lines, Messrs. W. S. Adams and G. Strömberg have made an exhaustive comparison between their spectroscopic parallaxes, which now number some 1500, and the parallaxes deduced from direct measures and proper motions; the results are given in Proc. Nat. Acad. Sci., July, 1919. The stars are divided into five spectral groups, A7 to F8, F9 to G8, G9 to K3, K4 to K9, and Ma to Md. The spectroscopic method has not yet been applied to types B_0 to A_6, as suitable spectral lines have not been found. The graphs show very satisfactory accordance, the weakest point being the fainter absolute magnitudes in the first group, where the spectroscopic determinations of distance are smaller than those measured directly. The last two groups indicate very clearly the division into giant and dwarf stars; this is also faintly indicated in the second and third groups, but not at all in the first.

The authors draw the satisfactory conclusion that "in this large amount of observational material hardly a single serious contradiction has been found between the spectroscopic and trigonometric results."

MINOR PLANETS.—Dr. F. Cohn gives his annual report on the orbits of recently discovered planets in *Astr. Nach.*, 5030. There are now 914 planets to which permanent numbers have been assigned, besides several hundreds which have been observed insufficiently; approximate orbits have been computed for about eighty of the latter. Two of the freshly numbered planets are of special interest—No. 898 for its high eccentricity, amounting nearly to 0·4, and No. 911, since it is a sixth member of the Trojan group, the mean motions of which are the same as that of Jupiter. Two others, Nos. 895 and 914, are notable for large inclinations, more than 25° in each case.

LUNAR PHOTOGRAPHY WITH THE 100-IN. REFLECTOR. *Popular Astronomy* and Pubs. Astr. Soc. Pacific for December contain reproductions of some beautiful photographs taken with the new reflector at Mount Wilson by Mr. F. G. Pease. Silver prints have also been presented to the Royal Astronomical Society. The equivalent focus is 134 ft.; the scale is, therefore, very large, and a wonderful amount of fine detail is shown. Prof. Hale notes that the instrument is to be called the Hooker telescope, in memory of the donor of the optical parts. It is welcome news that its performance comes up to the highest expectations, and that the Mount Wilson conditions of seeing prove equal to standing this most severe test upon them. "The (radial) motions of faint stars in the heart of globular clusters and in the star-clouds of the Milky Way can be measured." Nebulium has been found in the variable star R Aquarii, and luminous clouds of calcium vapour are found to surround the star in Hind's variable nebula in Taurus. It is also possible to study the spectra of the faint companions of close double stars.